

REMARKS

Claims 1, 6, 8, 10–13, 16–19, 25–28, 35–39, 41, and 42 are pending in the present application. Of these, Claims 1 and 28 have been amended, Claims 25–27, 35–38, 41, and 42 have been canceled, and no claims have been added, leaving Claims 1, 6, 8, 10–13, 16–19, 28, and 39 for consideration upon entry of the Amendment.

Amended Claims

Claim 1 has been amended without prejudice to remove the broader limitations to the precatalyst of Chemical Formula 1, and the broader description to the first and second cocatalysts, and to include limitations to: precatalysts $\text{Pd}(\text{acetylacetonate})_2$ and $\text{Pd}(\text{acetate})_2$ of Claim 25, canceled herewith, and the precatalyst $(\text{allyl})\text{Pd}(\text{acetylacetonate})$ of Claim 42, canceled herewith; a first cocatalyst tricyclohexylphosphine of Claim 26, canceled herewith; and a second cocatalyst of dimethylanilinium tetrakis(pentafluorophenyl)borate of Claim 27, canceled herewith.

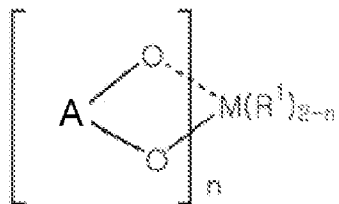
Claim 28 has also been amended to correctly depend from Claim 1.

Reconsideration and allowance of the claims is respectfully requested based upon the above amendments and the following remarks.

Claim Rejections under 35 U.S.C. § 112, first paragraph

Claims 1, 6, 8, 10–13, 16–19, 25–28, and 35–39 are rejected under 35 U.S.C. § 112, first paragraph, for allegedly failing to comply with the written description requirement. The Examiner alleges that the structure of Chemical Formula 1:

Chemical Formula 1



previously entered to clarify the generic ligand structure $[\text{O}-(\text{A})-\text{O}]$ in the original Chemical Formula 1, was not described in the specification in such a way as to reasonably convey that the Applicants had possession of the claimed invention. While

applicants respectfully disagree with the Examiner, Applicants have amended Claim 1 to remove limitations to Chemical Formula 1, and to include specific palladium (II) precatalysts, including Pd(acetate)₂, Pd(acetylacetonate)₂, and (allyl)Pd(acetyl acetonate), to claim these precatalysts.

As each of these precatalysts is fully disclosed and enabled in the instant specification, Applicants believe Claim 1 as amended should now be acceptable to the Examiner. Reconsideration and withdrawal of the rejections under 35 U.S.C. 112, first paragraph, is therefore respectfully requested.

Claim Rejections under 35 U.S.C. §112, second paragraph

Claim 25 is rejected as allegedly indefinite for failing to particularly point out and distinctly claim the invention. In particular, the Examiner states that the claims precatalysts are not supported by the formula of Chemical Formula 1 in Claim 1.

Claim 25 has been canceled, and therefore any rejection of this claim is now moot.

Claim 1 has been amended to remove limitations to Chemical Formula 1 without prejudice, and precatalysts of Claims 25 and 42 have each been included in Claim 1. These precatalysts, Pd(acetate)₂, Pd(acetylacetonate)₂, and (allyl)Pd(acetyl acetonate), are each fully disclosed in the Specification and would reasonably convey to one skilled in the art the inventive subject matter claimed by Applicants, irrespective of whether these compounds depend from Chemical Formula 1 in Claim 1; however, as Claim 1 has been amended to remove Chemical Formula 1, and since the precatalysts claimed in amended Claim 1 no longer depend from Chemical Formula 1, there is no longer any question of providing antecedent basis for these precatalysts as they are claimed directly.

For at least these reasons therefore, Claim 25 is not indefinite. Reconsideration and allowance are respectfully requested.

Claim Rejections under 35 U.S.C. § 103(a)

Claims 1, 6, 8, 10–13, 16-19, 25–28, 35-39, 41, and 42 are rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 6,455,650 (“Lipian”).

Lipian discloses a method of making cycloolefin polymer with a cationic Group

10 metal (M) complex and a weakly coordinating anion (WCA) having the formula $[(R')_z M(L')_x (L'')_y]_b [WCA]_d$, in which L' is a Group 15 neutral electron donor ligand, L'' , is a labile neutral electron donor ligand, the sum of x , y , and z is 4, and b and d are integers. Abstract.

Lipian extensively discloses addition polymers prepared using norbornene-type monomers. Col. 29, line 46 to Col. 38, line 10. The norbornene-type monomers may be substituted with pendant groups including hydrocarbyl or a pendant substituent containing an oxygen atom. Col. 30, lines 1-9. Preparation of the norbornene-type monomers by Diels-Alder reaction is also disclosed. Col. 34, lines 19-65. Cross-linking multicyclic norbornenes are also disclosed as interchain crosslinking units. Col. 32, lines 56-66. A specific cross-linking multicyclic norbornene, *exo-trans-exo* norbornene dimer, is disclosed in Examples 183, 185, and 186. Col. 83, line 59; Col. 84, lines 22 and 30.

For an obviousness rejection to be proper, the Examiner must meet the burden of establishing that all elements of the invention are disclosed in the prior art; that the prior art relied upon, or knowledge generally available in the art at the time of the invention, must provide some suggestion or incentive that would have motivated the skilled artisan to modify a reference or combined references. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988).

Claim 1, as amended, specifically claims a catalyst mixture comprising as precatalyst $Pd(acetate)_2$, $Pd(acetylacetonate)_2$, and $(allyl)Pd(acetylacetonate)$; a first cocatalyst of tricyclohexylphosphine; and a second cocatalyst of dimethylanilinium tetrakis(pentafluorophenyl)borate.

Lipian discloses, *individually*, palladium (II) acetate and palladium (II) acetyl acetonate (Col. 22, line 36-37), and does not disclose allylpalladium acetylacetonate. Lipian also discloses tricyclohexylphosphine, and also discloses dimethylanilinium tetrakis(pentafluorophenyl)borate. Col. 10, line 57; Col. 26, lines 58-59. However, Lipian fails to disclose, with any specificity, a catalyst mixture composition comprising the specific combination of precatalyst, and first and second cocatalysts claimed in Claim 1. For this reason at least, Lipian fails to disclose all elements of the instant claims.

Lipian fails to provide a suggestion or incentive that would lead one skilled in the art to select the claimed combination of precatalyst, and first and second cocatalyst, claimed in Claim 1. Example 10, cited by the Examiner, discloses a precatalyst that is a combination of allylpalladium(tri-*o*-tolylphosphine)acetate (Col. 46, lines 45-57), but does not disclose a combination of tricyclohexylphosphine and dimethylanilinium tetrakis(pentafluorophenyl)borate with any of the palladium precatalysts as claimed in Claim 1. Example 10 therefore also fails to provide a suggestion or incentive that would lead one skilled in the art to assemble the catalyst mixture from the components.

The Examiner states repeatedly in the Final Office Action on p. 13, last paragraph, that Lipian “clearly” discloses the claimed catalyst components. However, the Examiner has not made a case for combining each of these disparate components from among the dozens of different precatalysts, weakly coordinating anions, and phosphine compounds disclosed in Lipian, to produce the particular catalyst claimed in Claim 1. “A patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *KSR Int’l Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1741 (2007). To find obviousness, the Examiner must “identify a reason that would have prompted a person of ordinary skill in the art in the relevant field to combine the elements in the way the claimed new invention does.” *Id.* Lipian, despite its disclosure of numerous possible precatalyst, phosphine, and weakly coordinating anions, and the art as a whole, fail to provide a reason for one of ordinary skill in the art to modify Lipian in the manner required to meet claims 1. *In re Laskowski*, 871 F.2d 115, 117, 10 U.S.P.Q.2d 1397, 1398 (Fed. Cir. 1989) (“Although the Commissioner suggests that [the structure in the primary art reference] could readily be modified to form the [claimed] structure, ‘[t]he mere fact that the prior art could be so modified would not have made the modification obvious unless the prior art suggested the desirability of the modification’”) (citation omitted); *In re Stencel*, 828 F.2d 751, 755, 4 U.S.P.Q.2d 1071, 1073 (Fed. Cir. 1987) (obviousness cannot be established “by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion that the combination be made”). There is no teaching or suggestions to combine elements of the prior art to produce the present invention. The present invention is thus nonobvious.

For at least these reasons therefore, there is no suggestion or incentive in Lipian that would provide a suggestion or incentive that would lead one skilled in the art to modify Lipian to provide the specific catalyst mixture claimed in Claim 1.

Furthermore, the requirement for a determination of obviousness is that "both the suggestion and the expectation of success must be founded in the prior art, not in applicant's disclosure" (emphasis added). *In re Dow Chem.*, 837 F.2d 469, 473, 5 U.S.P.Q.2d 1529, 1531 (Fed. Cir. 1988). There is no expectation to be found in the disclosure of Lipian to provide the catalyst mixture claimed in Claim 1 to polymerize polar monomers of Chemical Formula 5 claimed in Claim 1, to provide a cycloolefin polymer comprise more than 30 mole-% of norbornene-based compound containing polar functional group, as represented by Chemical Formula 5. In addition, the cycloolefin polymer is prepared by a method in which the overall catalyst mixture, and specifically the type and amounts of components in the catalyst mixture, are selected such that a product yield of 50% or more (based on the total weight of monomer) can be achieved for the copolymer.

Lipian does not disclose a method of producing a polar-functional group containing norbornene copolymers of Applicant's description (i.e., where the polar norbornene is present at greater than 30 mole%) using the catalyst mixture of Claim 1, including combination of catalyst components, and further does not disclose such a combination that produces a product yield for a polymer of a polar norbornene (corresponding to Chemical Formula 5) of 50% or more. Lipian is silent as to both high yield (50% or more based on monomer conversion) for these types of polymers, and is silent as to the combination of catalyst and monomer claimed in Claim 1. Lipian thus fails to teach all elements (high yield, polymer composition) of the method of the instant claims.

Lipian also fails to provide a suggestion or incentive that would lead one skilled in the art to modify Lipian to provide the missing elements, and which would satisfy the requirements of the method of Applicants Claim 1. There is no suggestion or incentive provided by the Specification or Examples of Lipian, which would suggest a modification to Lipian that would allow one skilled in the art to predict a high yield for the claimed copolymers of the method of Claim 1, with a reasonable expectation for

success.

Lipian does not disclose an example of a cycloolefin polymer having more than 30 mole% of norbornene compound with a polar group (as defined by Applicants Chemical Formula 5), with a product yield of 50% or more based on total monomer weight. In addition, Lipian does not provide a reasonable expectation that even polymers having the same types of functional groups would exhibit predictable behavior.

Specifically, as mentioned in the Final Office Action dated July 10, 2009, on p. 14, last 2 paragraphs, Lipian discloses Examples 125, 127, and 163 in which the following norbornene polymers are disclosed: hexylnorbornene-5-triethoxysilylnorbornene-hexene terpolymer (Ex. 125) obtained in 100% yield; hexylnorbornene-5-triethoxysilylnorbornene-cyclohexene-hexene tetrapolymer (Ex. 127) obtained in a 15% yield, and 5-butylnorbornene-triethoxysilylnorbornene copolymer obtained in a 60% yield. Each of these polymers has at least 2 monomers in common, and yet fails to provide an indication of predictability in the yield which is asserted to be “inherent” by the Examiner. As stated in MPEP 2143.02 (II), though obviousness does not require *absolute* predictability, *at least some* degree of predictability is required. Evidence showing there was no reasonable expectation of success may support a conclusion of nonobviousness. *In re Rinehart*, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976). Applicants contend that there is no predictability to be found at all in the cited teachings of Lipian, and evidence, such as in the Examples 125 and 127, which shows the complete lack of predictability of yield for similar polymers. The subject of the present claims and the cited art being catalysts, it is worth noting that it is well-recognized that the art of catalysis is highly unpredictable, and that even small changes in composition (as seen in, for Example, the differences in feed composition in Examples 125 and 127) can have unexpected effects. “The unpredictability of catalytic phenomena has been recognized. . . [A] successfully catalyzed process depends not only on the particular catalyst that may be employed but also on the environment within which the catalysis is accomplished” *In re Mercier*, 515 F.2d 1161, 185 U.S.P.Q. 774, 779-80 (C.C.P.A. 1975).

Because of the inherent unpredictability associated with catalysts, one of ordinary skill in the catalytic art will appreciate that it is impossible to make the

generalization that Lipian's examples, which are drawn to copolymer compositions not claimed by Applicants, would be applicable to Applicants method. This lack of predictability is highlighted particularly significant as Examples 125 and 127 each uses the same catalyst (lithium tetrakis(pentafluorophenyl) borate etherate-allylpalladium(tricyclohexylphosphine) triflate) and yet exhibit dramatically different yields (100% for Ex. 125; 15% for Ex. 127). There is no predictability at all to be found in these yields, when compared with Applicant's Claim 1, and hence, there is no reasonable expectation for success to be found in Lipian for the combination of elements claimed in Claim 1. In fact, most of the Examples of Lipian disclose either silyl group-containing norbornenes not claimed in Claim 1. Lipian fails to provide a teaching therefore that would lead one skilled in the art to look for a combination of precatalyst, cocatalyst, and ligand that would work with a polar group containing norbornene as claimed in Claim 1 (Chemical Formula 5). While the Examiner points to a list of examples in Lipian which have high yields (see Office Action dated July 10, 2009, p. 14, last two paragraphs) and while the Examiner states that it "is desirable to obtain a process capable of producing a product yield of greater than 50 wt% or more", the Examiner has not identified a teaching in Lipian which would show exactly *how* this may be accomplished based on at least some tangible demonstration of high yield for a polymer containing a polar group, with any reasonable level of predictability, and therefore a reasonable *expectation* for this outcome based on Applicants Claim 1 has not been established.

Furthermore, Claim 1 claims a polymer having greater than 30 mole% of a *polar* functional group where, in Chemical Formula 5, a silyl group containing monomer is *not* claimed, whereas Lipian primarily discloses silane-containing polymers such as 5-triethoxysilylnorbornene based polymers as exemplified in Examples 125, 127, and 163, discussed above. As to polymers having polar norbornene-containing monomers, Lipian discloses, for example in Example 134, the preparation of a 5-norbornenemethanol-acetate ester, which is provided in a yield of 5%. This is an exceptionally low yield, significantly lower than the 50% or more claimed by Applicants for Applicant's method, and provides a clear example of a polar norbornene within the composition of Chemical Formula 5 of Claim 1 (i.e., where m is 0 and only

one of R^{10} - R^{13} is $R^{14}OC(O)R^{15}$ in which R^{14} is methylene and R^{15} is methyl) which does not meet the requirement of production in high yield (hence, using an appropriate catalyst specifically meeting the requirements of Claim 1) that is claimed the method of Claim 1. Applicants note also that the catalyst in Example 134, based on an allylpalladium dimer, is not a precatalyst claimed within the limitations claimed in instant Claim 1. Lipian thus does not exemplify the limitations as claimed, and does not therefore provide a suggestion or incentive to modify, e.g., Example 134, with the catalyst claimed in Claim 1, with an expectation that the combination would successfully and *predictably* meet the required yield element of the instant claim.

As to the assertion of inherency as to the product yield of 50 % or more for the claimed method as applied to the catalyst combination and polar monomers of Claim 1 (the achievement of which has been amply demonstrated by Applicants Examples; see specifically, for example, Examples 1-4 of Table 1 where the lowest yield obtained for polymers of polar norbornenes of Chemical Formula 5 is 67%; Specification on p. 27, etc.; and as discussed above, where such yields are not demonstrated for polar molecules by the cited reference), Applicants respectfully submit that the Examiner has inappropriately used the doctrine of inherency in putting forth a rejection under 35 U.S.C. §103 (a) (“product yield of greater than 50 wt%” is inherently possessed in Lipian et. al.’, Final Office Action dated July 10, 2009, p. 15, 2nd paragraph).

The courts have repeatedly made the distinction that “the inherency of an advantage and its obviousness are entirely different questions. That which may be inherent is not necessarily known. Obviousness cannot be predicated on what is unknown.” *In re Spormann*, 150 U.S.P.Q. 449, 452, (CCPA, 1966), citing *In re Adams*, 53 CCPA 996, 356 F.2d 998, 148 U.S.P.Q. 742. “Further it confuses anticipation by inherency, i.e., lack of novelty, with obviousness, which though anticipation is the epitome of obviousness, are separate and distinct concepts.” *Jones et al. v. Hardy*, 220 U.S.P.Q. 1021, 1025 (CCPA, 1984) citing *In re Pearson*, 494 F.2d 1399, 181 U.S.P.Q. 641 (CCPA, 1974); *In re Oelrich*, 666 F.2d 578, 212 U.S.P.Q. 323 (CCPA, 1981). “The examiner should be aware that inherency and obviousness are distinct concepts.” *Ex parte GPAC Inc.*, 29 U.S.P.Q.2d 1401, 1415, n. 15, citing *In re Naylor*, 369 F.2d 765, 152 U.S.P.Q. 106 (CCPA 1966); *In re Henderson*, 348 F.2d 550,

146 U.S.P.Q. 372 (CCPA 1965). “The theory of inherency is normally reserved for rejections under 35 U.S.C. § 102.” *In re Grasselli*, 318 U.S.P.Q. 303 (Fed. Cir. 1983). Withdrawal of the rejection of obviousness under inherency is respectfully requested.

Lipian thus does not disclose a catalyst and method (as claimed in Claim 1) that explicitly provides copolymers, having greater than 30 mol% of polar norbornenes of Chemical Formula 5, in high yield (50% or more), and therefore fails to provide all elements of the instant claims. Furthermore, Lipian fails to provide a suggestion or incentive that would lead one skilled in the art to modify Lipian to provide the missing limitations, with predictability and with a reasonable expectation for success.

Therefore, Claim 1 and dependent claims 6, 8, 10-13, 16-19, 28, and 39 are not unpatentable over Lipian, which fails to provide a teaching or suggestion that would lead one skilled in the art to modify Lipian to arrive at the invention of the instant Claims and fails to provide a reasonable expectation for success as evidenced by Applicants Exemplary data.

It is believed that the foregoing amendments and remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants. Accordingly, reconsideration and withdrawal of the rejections and allowance of the case are respectfully requested.

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130.

Respectfully submitted,
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